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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/574,120

05/31/2007

Michel Bruel

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EXAMINER

KHARE, ATUL P

ART UNIT

PAPER NUMBER

1742

NOTIFICATION DATE

DELIVERY MODE

07/14/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/574,120	Applicant(s) BRUEL, MICHEL	
	Examiner ATUL P. KHARE	Art Unit 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 34-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-53 is/are rejected.
- 7) ☒ Claim(s) 37 and 47 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendments filed 29 April 2011 have been entered and fully considered.
2. Claims 34-53 are currently pending, all of which are new. Claims 1-33 have been canceled.

Claim Objections

3. Claim 37 is objected to because of the following informalities: The phrase “the forces” indicates that the claim should be corrected to depend from claim 36.

Appropriate correction is required.

4. Claim 47 is objected to because of the following informalities: The term “comically” at line 2 of the claim should be changed to “chemically”. Appropriate correction is required.

5. Claim 47 is objected to because of the following informalities: The term “or” at line 2 of the claim should be changed to “and/or”, and boro-silicate glass should be added to the list of intermediate layers. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 34-36, 41, 46, 50, and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Moriceau et al. (WO 99/35674). For examination, US 6,756,286 will be used as an English language Equivalent for WO 99/35674.

8. As to claim 34, Moriceau teaches a method for fabricating a structure in the form of a plate comprising: providing at least one intermediate layer 32 interposed between a substrate and superstrate, wherein the intermediate layer has a base material having distributed therein extrinsic atoms/molecules which differ from those of the base material (12:40-50, 3:37-39, 7:1-4, figure 7); and applying a heat treatment to the structure in a temperature range that causes the intermediate layer to become plastically deformable with the extrinsic atoms or molecules in the base material causing an irreversible formation of microbubbles or microcavities in the intermediate layer in a configuration and amount sufficient to weaken the intermediate layer (12:58-64, 3:52-65, 4:10-13, 4:26-29, 8:60-67, 9:30-46, 10:13-21).

9. As to claim 35, Moriceau teaches that the heat treatment is continued until it produces a rupture of the intermediate layer, and, as a result, separation of the substrate from the superstrate (12:58-64, 4:10-13).

10. As to claim 36, Moriceau teaches applying forces between the substrate and superstrate (such as heat or mechanical forces) to bring about the rupture of the intermediate layer between the substrate and superstrate, which implicitly occurs due to the presence of the microbubbles or microcavities (12:58-64, 4:42-44).

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11. As to claim 41, Moriceau's microbubbles or microcavities implicitly have a volume after heat treatment such that they are open on the substrate or superstrate side and furthermore that they are mutually open to constitute channels which are open to the side ends of the intermediate layer (abstract, 2:31-33, 3:37-39, 3:63-65, 6:37-40, 8:65-67).

12. As to claim 46, Moriceau teaches the use of monocrystalline silicon (5:63-64).

13. As to claim 50, Moriceau teaches depositing the intermediate layer on the substrate and attaching the superstrate to the intermediate layer by (molecular) wafer bonding (4:34-41, 11:56-60, 12:3-6, 12:55-57).

14. As to claim 53, the resulting silicon on insulator plate obtained by Moriceau (as described in the rejection of claim 34 above) is suitable for the claimed intended uses (MPEP 2111.02).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

17. Claims 39, 40, 42, and 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriceau et al. (WO 99/35674) as applied to claims 34-36, 41, 46, 50, and 53 above. For examination, US 6,756,286 will be used as an English language Equivalent for WO 99/35674.

18. As to claims 39 and 47, Moriceau teaches that in the alternative to hydrogen, other gaseous compounds such as oxygen may be implanted to cause a similar effect (8:36-42, 9:1-29). Implantation of oxygen instead of hydrogen into the doped silicon material described in the rejection of claim 34 above would have caused the intermediate layer to be formed as a glass (9:6-12). It would have been obvious to substitute oxygen implantation for the hydrogen implantation described in the embodiment used to reject claim 34 above as an alternative means for accomplishing the same localized defects within the silicon material. As to claim 47, with this modification, the base material is thus made from silica and the extrinsic atoms are atoms of boron, thus forming an intermediate layer of borosilicate glass.

19. As to claim 40, Moriceau's process implicitly includes an increase in thickness (3:37-39, 6:24-27, 6:37-40, 11:39-40, 12:35-39). A person having ordinary skill in the art would have recognized that the implantation dose(s), heat budget, and relative doping of the intermediate layer would have influenced the physical and chemical properties of the inclusions zone, and thus would have influenced the growth and propagation of the

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microbubbles and microchannels within the intermediate layer. The claimed increase in thickness would thus have been obviously met by a person having ordinary skill in the art, who would have, through routine experimentation, discovered the optimum implantation dosage(s), heat budget, and relative doping of the intermediate layer in order to achieve the desired weakening and subsequent separation at this layer.

20. As to claim 42, Moriceau separately teaches that forming openings in a silicon material can help to later provide localized defects by implantation of gaseous compounds (8:12-51). It would have been obvious to provide these openings in the substrate or superstrate described in the embodiment used to reject claim 34 above in order to facilitate the formation of a locally defective region which can later be used as a separation layer. In this modified embodiment, the openings constitute projection portions in the substrate or superstrate which constitute notches that facilitate the formation of the channels described in claim 41.

21. As to claim 48, Moriceau teaches the use of an amount of boron that appears to implicitly meet the claimed range (12:40-50). In the alternative that it is ultimately determined that this amount does not meet the claimed range, a person having ordinary skill in the art would have recognized the degree of doping as a result-effective variable based on Moriceau's teachings (7:24-45). The degree of doping thus could have been readily optimized as a matter of routine experimentation to influence the formation of localized defects within the separation layer (7:24-45, MPEP 2144.05(II)).

22. As to claim 49, Moriceau teaches (as outlined above) that the heat budget is a result-effective variable that a person having ordinary skill in the art would have readily

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optimized as a matter of routine experimentation to achieve the desired amount of weakening and separation at the intermediate layer. Additionally, Moriceau teaches a heating range of above 1000°C (9:30-46), which overlaps with the claimed range (MPEP 2144.05(I)).

23. Claims 37, 51, and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriceau et al. (WO 99/35674) as applied to claims 34-36, 41, 46, 50, and 53 above, and further in view of Sato et al. (US 5,854,123). For examination, US 6,756,286 will be used as an English language Equivalent for WO 99/35674.

24. As to claim 37, Moriceau does not appear to explicitly disclose the claimed separation technique, but Sato teaches in a similar method that separation of bonded wafer materials can be conducted with a razor blade or with a water jet that is directed at the separation layer (5:36-58). It would have been obvious to incorporate these separation techniques into the Moriceau method as an alternative means for causing separation at the intermediate layer.

25. As to claims 51 and 52, Moriceau does not appear to explicitly disclose providing a thermal silicon oxide on the substrate or superstrate, but Sato teaches bonding between layers is preferable and can be facilitated through a thermal silicon oxide layer which has been deposited on a silicon support (19:14-23, 22:25-37). It would have been obvious to form Sato's thermal silicon oxide on Moriceau's substrate and superstrate in order to facilitate bonding between layers. According to Moriceau, the intermediate layer

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is subsequently deposited on the substrate and then attached to the superstrate by (molecular) wafer bonding (4:34-41, 11:56-60, 12:3-6, 12:55-57).

26. Claims 38, 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriceau et al. (WO 99/35674) as applied to claims 39, 40, 42, and 47-49 above, and further in view of Sato et al. (US 5,854,123). For examination, US 6,756,286 will be used as an English language Equivalent for WO 99/35674.

27. As to claim 43, Moriceau does not appear to explicitly disclose circulating a cooling fluid through the channels, but Sato teaches circulating a cooling fluid through a similar wafer stack as a means to cause separation at an intermediate porous layer (5:36-58). It would have been obvious to incorporate this separation technique into the Moriceau method as an alternative means for causing separation at the intermediate layer.

28. As to claims 38 and 44, Moriceau does not appear to explicitly disclose introducing an acidic solution into the intermediate layer, but Sato teaches facilitating separation at a porous intermediate layer by utilizing an acidic solution (9:22-45). It would have been obvious to incorporate this separation technique into the Moriceau method as an alternative means for causing separation at the intermediate layer.

29. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moriceau et al. (WO 99/35674) as applied to claims 34-36, 41, 46, 50, and 53 above, and further in view of Habberger et al. (US 6,417,075). For examination, US 6,756,286

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will be used as an English language Equivalent for WO 99/35674. As to claim 45, Moriceau does not appear to explicitly disclose reducing the thickness of the superstrate or superstrate, but Habberger teaches that thickness reduction of a substrate/superstrate material is sometimes preferable (5:5-10). It would have been obvious to incorporate Habberger's teachings into the Moriceau method in order to form a substrate and/or superstrate of a desired thickness.

Response to Arguments

30. Applicant's arguments with respect to claims 34-53 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ogura (US 5,888,297) teaches a method of fabricating an SOI substrate (abstract).

32. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

33. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ATUL P. KHARE whose telephone number is (571)270-7608. The examiner can normally be reached on Monday-Thursday 7:30 a.m. - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571)272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner, Art Unit 1742

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